

WHAT IS CLAIMED IS:

1. An iron based sintered body having a composition comprising, in % by mass, 0.5 to 2.5% of C, 5 to 40% of Cu, and the balance being Fe and inevitable impurities, a structure containing pores and free Cu phases dispersed in a matrix, an average thermal expansion coefficient from room temperature to 200°C of $13.5 \times 10^{-6}/^{\circ}\text{C}$ or less, and a surface roughness Rz of 10 to 100 μm , and being excellent in an enveloped casting property in a light metal alloy.
2. The iron based sintered body according to Claim 1, wherein the surface is subjected to a shot blast treatment.
3. The iron based sintered body according to Claim 2, wherein the surface further is subjected to a steam treatment after the shot blast treatment.
4. The iron based sintered body according to any one of Claims 1 to 3, wherein the matrix has a pearlite structure.
5. The iron based sintered body according to any one of Claims 1 to 4, wherein the structure further comprises free graphites dispersed in the matrix.
6. The iron based sintered body according to any one of Claims 1 to 5, wherein the pores are isolated each other or are partially connected each other.
7. The iron based sintered body according to any one of Claims 1 to 6, wherein a volume ratio of the pores relative to a total volume of the sintered

body is 5 to 35% by volume.

8. The iron based sintered body according to any one of Claims 1 to 7, wherein the composition further comprises 0.1 to 5% by mass of fine particles for improving machinability having a particle diameter of 150 μm or less and comprising at least one element selected from the group consisting of MnS, CaF_2 , BN and enstatite.

9. The iron based sintered body according to any one of Claims 1 to 8, wherein the composition further comprises, in % by mass, an amount of 40% or less in total of at least one element selected from the group consisting of 30% or less of Cr, 10% or less of Mo, 3% or less of Ni, 3% or less of Si, 2.5% or less of Mn, 5% or less of V, 5% or less of Ti, 3% or less of Nb and 5% or less of W.

10. The iron based sintered body according to Claim 9, wherein the matrix has any one of a bainite structure, a martensite structure and a mixed structure thereof.

11. The iron based sintered body according to any one of Claims 1 to 10 having a groove formed on any one of end faces and side faces or both.

12. The iron based sintered body according to any one of Claims 1 to 11, wherein the thermal expansion coefficient after being enveloped in an aluminum alloy by casting is $15.0 \times 10^{-6}/\text{°C}$ or less as an average thermal expansion coefficient from room temperature to 200°C.

13. A light metal alloy member enveloping the iron based sintered

body according to any one of Claims 1 to 12 by casting.

14. A method for producing an iron based sintered body used for being enveloped in a light metal alloy by casting comprising the steps of:

preparing a mixed powder by blending an iron based powder, a copper powder, a graphite powder and a lubricant powder;

filling the mixed powder into a mold;

forming a green compact by press-molding; and

forming a sintered body by sintering the green compact, wherein a pure iron is used as the iron based powder,

the copper powder and the graphite powder are blended so that the Cu content is 5 to 40% by mass and C content is 0.5 to 2.5% by mass relative to the total amount of the iron based powder, the copper powder and graphite powder in the mixed powder,

at least any one of the molding condition of the compressed powder and sintering condition of the sintering is controlled so that the average thermal expansion coefficient of the sintered body is $13.5 \times 10^{-6}/^{\circ}\text{C}$ or less from room temperature to 200°C ; and

the surface roughness R_z is adjusted to 10 to 100 μm .

15. The method for producing the iron based sintered body according to Claim 14, wherein any one of a ferritic stainless steel powder, a martensitic stainless steel powder, pure iron powder and ferritic stainless steel powder, pure iron powder and martensitic stainless steel powder, is used as the iron based powder, instead of the pure iron powder for the iron based powder.

16. The method for producing the iron based sintered body according

to any one of Claims 14 and 15, wherein further comprises a step of applying a steam treatment after the shot blast treatment.

17. The method for producing the iron based sintered body according to any one of Claims 14 to 16, wherein the mixed powder contains, relative to the total amount of the mixed powder, 0.1 to 5% by mass of the fine particle powder for improving machinability comprising at least one element selected from the group consisting of MnS powder, CaF₂ powder, BN powder and enstatite powder with a particle diameter of 150 µm or less.

18. The method for producing the iron based sintered body according to any one of Claims 14 to 17, wherein the mixed powder is further blended any one of a Cr powder, Mo powder, W powder, Fe-Cr powder, Fe-Mo powder and Fe-W powder, alone or in combination, as alloy element powder,

so that the mixed powder comprises, in % by mass, 40% or less in total of at least one element selected from the group consisting of 30% or less of Cr, 10% or less of Mo, 5% or less of W, 3% or less of Si and 2.5% or less of Mn relative to the total amount of the mixed powder.

19. The method for producing the iron based sintered body according to any one of Claims 14 to 18, wherein a groove is formed further on any one of end faces and side faces or both, of the green compact in the press-molding step.

20. The method for producing the iron based sintered body according to any one of Claims 14 to 18, wherein a groove is formed further on any one of end faces and side faces or both, of the green compact in the press-molding and a succeeding machining step.

21. The method for producing the iron based sintered body according to any one of Claims 14 to 18, wherein a groove is formed further on any one of end faces and side faces or both, of the sintered body by machining after sintering.

22. The method for producing the iron based sintered body according to claim 14, wherein the surface roughness R_z is adjusted by applying a shot blast treatment to the sintered body.